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Revision of African *Apiocera* (Diptera: Apioceridae)

by

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ABSTRACT

Africa has three species of *Apiocera* (Diptera: Apioceridae), all restricted to the Cape province of South Africa. *Apiocera africana* Paramonov is newly synonymised with *A. alastor* (Walker). A new species, *A. badipeniculata*, is described from specimens collected in the Tankwa district of the Karoo. *A. braunsi* Melander is the most widespread species and is most abundant in collections. All African species are shown to belong to a monophyletic group distinct from their congeners on other continents. *A. alastor* and *A. braunsi* are sister-species. Wing venation, abdominal patterns and features of the male genitalia are illustrated, species distributions are mapped and a key to species is provided.

INTRODUCTION

The Apioceridae is the smallest family of Asiloidea numerically, with 5 genera and about 150 described species worldwide (Peterson 1981). The African Apioceridae comprise two genera, *Tongamya* Stuckenberg and *Apiocera* Westwood, both only recorded to date in South Africa (Stuckenberg 1980). Three species of *Apiocera* have been described from South Africa: *A. alastor* (Walker), *A. braunsi* Melander and *A. africana* Paramonov. The present study arose from ongoing research aimed at reconstructing the biogeographic history of *Apiocera*, following Hennig's (1966) suggestion that the genus exhibited an Antarctic (Gondwanan) distribution pattern.

Outside of southern Africa, *Apiocera* is recorded from North America (63 species; Cazier 1982 1985), South America (4 species; Artigas 1970), and Australia (67 species; Paramonov 1953, Daniels 1989). In addition, Bigot reported a species from Sri Lanka (Verrall 1909) and Westwood an Australian species from Borneo (Nagatomi 1975), although these records are unsubstantiated with further specimens.

The immature stages of African *Apiocera* have not been recorded. However, the larvae and pupae of an Australian species, *A. maritima* Hardy, were dug from a beach in the uppermost 25 cm of sand near the high water mark (English 1947), and Toft & Kimsey (1982) reported a fifth instar larva and pupae of *A. hispida* Cazier from sandy soils in Death Valley, California. The larvae are predatory and similar in appearance to those of Asilidae.

Hermann (1909) proposed the name *Ripidosyrma* for the South African *Apiocera*, although this has not been accepted by subsequent workers (Paramonov 1950; Stuckenberg 1980). The South African species are a monophyletic group of

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Apiocera, distinguished by a plume of hairs on the apex of the male gonocoxites. However, they are otherwise typical of the genus, and are retained in *Apiocera* here.

METHODS

Morphological terminology follows McAlpine (1981), except that I follow Wood (1991) in terming the complex, sheathed intromittent organ in Asiloidea the phallus. Male genitalia were examined by placing the terminal segments of the abdomen in 10% KOH overnight, then rinsing in glacial acetic acid and distilled water. Specimens were stored and examined in glycerine. Drawings were made using a Wild M5 stereomicroscope with camera lucida.

Label data of type material is quoted verbatim; a slash indicates data on a different label.

Abbreviations: BMNH, The Natural History Museum, London; NMSA, Natal Museum, Pietermaritzburg; SAMC, South African Museum, Cape Town; USNM, United States National Museum, Washington; WSUC, James Entomological Collection, Washington State University, Pullman.

TAXONOMY

Apiocera Westwood, 1835

Apiocera Westwood, 1835: 448. Type species: *Apiocera fuscicollis* (= *A. brevicornis* (Wiedemann)), by subsequent designation of Coquillett (1910: 508), Australia.

Tapinocera Macquart, 1838: 78. Type species: *Laphria brevicornis* Wiedemann, by monotypy, Australia.

Pomacera Macquart, 1847: 63. Type species: *P. bigotii* Macquart, by monotypy, Australia.

Anypenus Phillippi, 1865: 702. Type species: *A. brevicornis* Phillipi, by subsequent designation of Brèthes (1924), South America.

Ripidosyrma Hermann, 1909: 104. Type species: *Apiocera braunsi* Melander, by original designation, South Africa.

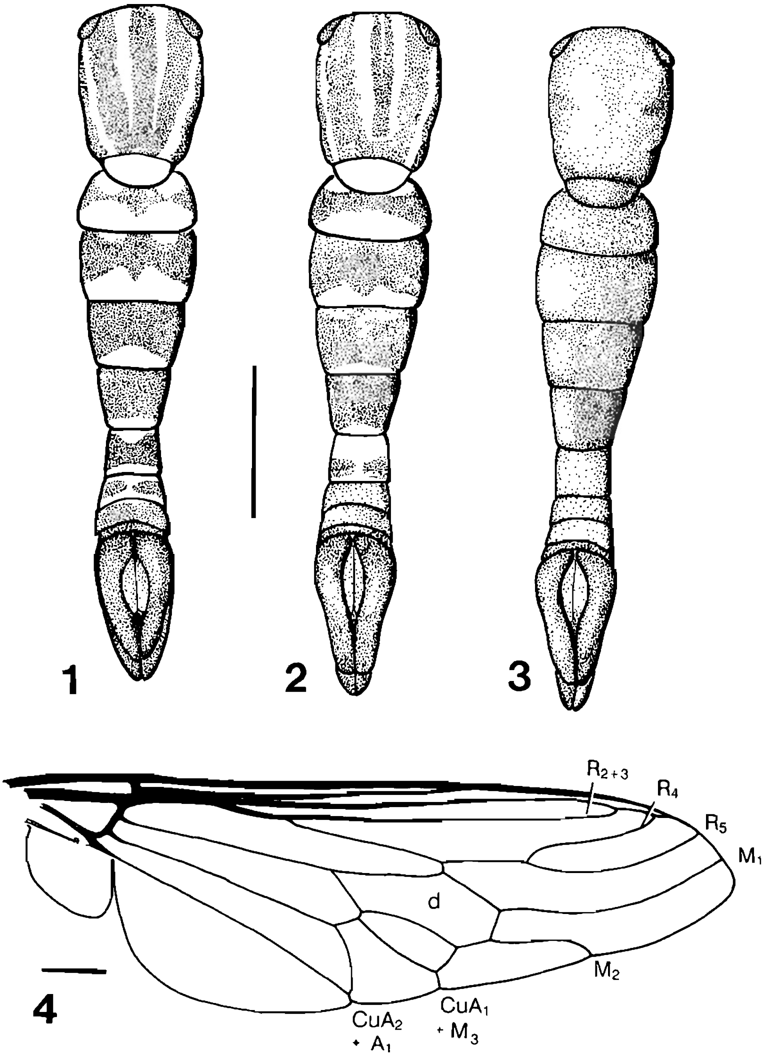
The South African species are diagnosed as follows: *Head*: Both sexes with eyes widely separated, frons almost parallel-sided; antennae short, flagellum two-segmented, first segment pear-shaped, second small and cylindrical with acute apex; proboscis short, hidden in buccal cavity; palpi two-segmented, second segment dorsoventrally flattened, broadly crescent-shaped. *Thorax*: Wings with membrane hyaline (Fig. 4), veins M_1 and R_5 curving forward to join wing margin before apex; discal and m_3 cells present; M_3 and CuA_1 united before wing margin, CuA_2 and A_1 united just before margin. *Abdomen*: Elongate, cigar-shaped, tapered towards apex. *Male genitalia*: Comparatively large; epandrium divided medially into two sclerites (Figs 6, 9); hypandrium large, independent of gonocoxites (Fig. 5); gonocoxites separate, not fused in midline; gonostyli articulated on inner margin of each gonocoxite, adjacent to base of phallus (Fig. 5); inner faces of gonocoxites with complex lobes flanking gonostyli; ejaculatory apodeme large, rounded in lateral view; lateral aedeagal apodemes relatively small, directed dorsally and posteriorly (Fig. 5). *Female genitalia*: Acanthophorites with row of stout spines, fused to tergite 9; three poorly sclerotised spermathecae.

Apiocera alastor (Walker)

Figs 2, 8, 10

Asilus alastor Walker, 1849: 444.

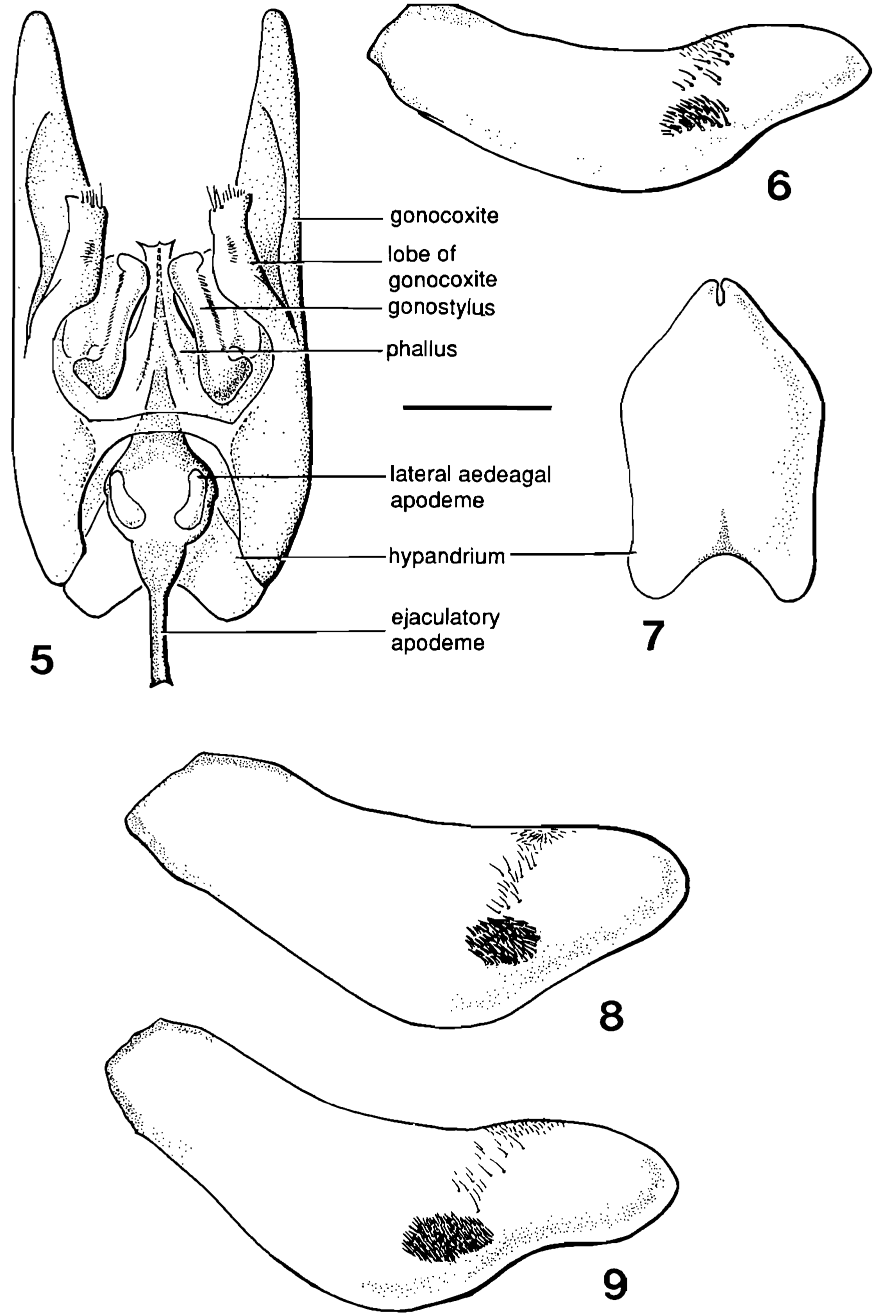
Apiocera africana Paramonov, 1950: 104. **Syn. n.**



Figs 1–4. African *Apiocera* species 1–3. Dorsal view of thorax and abdomen, showing different colour patterns. 1. *A. braunsi* Melander. 2. *A. alastor* (Walker). 3. *A. badipeniculata* sp. n. [Scale line = 5 mm.]. 4. *A. badipeniculata* sp. n., right wing. [Scale line = 1 mm.]

Types:

Asilus alastor, holotype male: 'TYPE Asilus alastor Walker / S. Africa Dr A. Smith 44.6/39a' (BMNH). Condition poor, body covered in fine cream-coloured detritus, head of holotype replaced with that from a different species (glued onto thorax, one antennal flagellum missing). Both fore, one mid and one hind leg missing, as are hind tarsi and mid tarsomeres 4+5.


gonocoxite
lobe of gonocoxite
gonostylus
phallus
lateral aedeagal apodeme
hypandrium
ejaculatory apodeme
5
6
7
8
9

Figs 5–9. African *Apiocera* species, male genitalia. 5–7. *A. braunsi* Melander. 5. Dorsal view (epandrium removed). 6. Inner face, left epandrial lobe. 7. Ventral view, hypandrium. 8. *A. alastor* (Walker), inner face, left epandrial lobe. 9. *A. badipeniculata* sp. n., inner face, left epandrial lobe. [Scale line = 1 mm.]

Apiocera africana, syntype male: 'Sutherland Distr. C.P., H. Zinn January 1947 / SA. Museum / *Apiocera Africana* nov. ♂ Typus, Paramonov det. / TYPE' (SAMC). Condition good, right hind tarsomeres 2–5 missing. Syntype female: 'Sutherland Distr. C.P., H. Zinn January 1947 / S.A. Museum / *Apiocera africana* nov. ♀ Typus, Paramonov det. / TYPE' (SAMC). Condition good, left antennal flagellum and left hind leg missing.

Diagnosis: Scutum and abdominal tergites strongly marked in chocolate brown and white (Fig. 2). Antennal flagellum light brown, scutellum with white pruinescence; costal vein ending at A_1; male genitalia with plume of long white hairs at apex of gonocoxites.

Other specimens examined: SOUTH AFRICA: *Cape*: 1 ♂ 1 ♀, same data as syntypes but labelled 'Cotypus' (SAMC); 1 ♂ 3 ♀, Tankwa [Distr.], Karoo, i.1949, Zinn-Hesse Mus. Exp. (SAMC).

Comments: The holotype of *A. alastor* (Walker) is currently a 'mosaic', consisting of parts from different specimens. Its body belongs to the original specimen seen by Walker, but the head is from a different (probably Australian) species. The holotype's head was clearly present originally, as Walker described its features, including the black palpi with black bristles. The replacement head has light brown-yellow palpi with yellow-white hairs.

This species is only represented in collections by a handful of specimens, all from the southwestern Cape (Fig. 10).

A. braunsi Melander

Figs 1, 5–7, 10

Apiocera braunsi Melander, 1907: 125.

Type:

Apiocera braunsi, holotype male: 'Capland, Willowmore, 1.1.1905, Dr Brauns / *Rhipidosyrma* [sic] *braunsi* Mel ♂ Type 58' (NMSA). Condition good. Although Melander failed to give a type depository in his original description, I assume this specimen is the holotype because it bears label data consistent with the original description. The holotype was found not to be in WSUC (Dr R. Zack, *pers. comm.*) where Melander was employed in 1907 or in USNM where his collection was eventually deposited (Dr N. Woodley, *pers. comm.*).

Diagnosis: Scutum and abdominal tergites strongly marked in chocolate brown and white (Fig. 1). Antennal flagellum dark brown-black, scutellum white, wings with costal vein continuing along anal cell; male abdomen with white plume of long white hairs at apex of gonocoxites.

Specimens examined: SOUTH AFRICA: *Cape*: 39 ♂ 39 ♀, Merweville Distr., i–ii.1947, H. Zinn (SAMC); 8 ♂ 8 ♀, Merweville, Laingsburg Distr., i.1959, H. Zinn (SAMC); 26 ♂ 26 ♀, Nieuveld Escarpment, Rietvlei, i.1949, Zinn-Hesse Mus. Exp. (SAMC); 2 ♂ 2 ♀, Beaufort West, Oukloof, i.1949, Zinn-Hesse Mus. Exp. (SAMC); 1 ♀, Willowmore, 15.xii.1912, Dr Brauns (NMSA); 2 ♂ 1 ♀, same data except xii.1914 (SAMC, NMSA); 2 ♂, same data except 15.xii.1912 (NMSA); 7 ♂ 1 ♀, same data except 20.xii.1921 (NMSA); 1 ♂ 1 ♀, same data except 1.ii.1923

(NMSA); 1 ♂, Gouph, Laingsburg, ii.1938, Div. Mus. Staff (SAMC); 1 ♂, Rooinek, Laingsburg Distr., i.1949, Zinn-Hesse Mus. Exp. (SAMC); 1 ♀, Matjiesfontein, 19–31.xii.1928, R. E. Turner (BMNH); 1 ♂, Nelspoort, 4.xii.1933, J. Ogilvie (BMNH); 1 ♂, Willowmore, 20.xii.1921, Dr Brauns (BMNH); 2 ♂ 1 ♀, Graaff-Reinet, Urquhart Park Caravan Park, 32°15'S:24°33'E, 4–6.xii.1988, J. G. H. Londt, Riverine veg., sandy ground (NMSA); 1 ♀, 70 km E. Laingsburg, dry Dwyka River area, 33°06'S:21°35'E, 24.xi.1990, Whittington & Londt, 500 m (NMSA); 1 ♀, 23 km N. Middelpos, at Kookfontein River, 31°44'S:20°14'E, 29.xi.1990, Whittington & Londt, 1170 m (NMSA).

Comments: Little needs to be added to Melander's description. Females have a slightly different colour pattern to males; the scutal pattern is less distinct, and the abdominal tergites have variable grey markings on the anterior regions of tergites 1–4. The male genitalia are illustrated in Figs 5–7. The female from Willowmore (NMSA) is labelled 'type', but was collected in 1912, long after Melander's 1907 description.

A. braunsi is more common in collections than *A. alastor*, and has been collected at a larger number of localities. The striking, similar colour patterns of the scutum and abdomen in *braunsi* and *alastor* (Figs 1–2), indicates they are sister species.

A. badipeniculata sp. n.

Figs 3–4, 9–10

Types:

Holotype male, SOUTH AFRICA: 'Tankwa, Karoo, C.P., Zinn-Hesse Mus. Exp.Jan.1949' (SAMC). Condition good, some verdigris around pin. Paratype male, same data and condition as holotype.

Measurements: Head 3.5 mm wide; thorax 5.3 mm long; abdomen 14.6 mm long.

Diagnosis: Antennal flagellum and all head vestiture black; scutum, scutellum and abdominal tergites 1–4 entirely black, abdominal tergites 5–7 with orange integument and sparse black vestiture (Fig. 3). Wings with costal vein continuing along anal cell (Fig. 4); male genitalia with plume of long, coppery-brown hairs at apex of gonocoxites.

Description:

Head: Integument and vestiture entirely black. Inner margin of eyes parallel dorsally, diverging on ventral half, frons width twice that of ocellar triangle. Flagellum of two flagellomeres, first rounded, second small, peg-shaped and about as wide as high with acute apex. Short hairs on frons, long hairs on scape, shorter hairs on pedicel, long hairs on palp and ventral half of head. Palp with two segments, second segment crescent-shaped and apex pointed. Long bristle-like hairs on postcranium.

Thorax: Integument and vestiture entirely black (Fig. 3). Scutum and scutellum with long bristles around margin and shorter hairs over entire surface, pleura bare except antepronotum and proepisternum with hairs. Legs black or dark brown with black hairs and bristles. Pulvilli three-quarters length of tarsal claw. Haltere stem and bulb black.

Wings: Membrane hyaline, venation similar to congeners (Fig. 4). Veins dark brown, costal vein continuing along anal cell as in *A. braunsi*. R_4 joining common R vein before wing margin, crossvein r-m at middle of discal cell, all veins of median field reaching margin strongly, CuA_2 and A_1 united just before wing margin.

Abdomen: Tergites 1–4 black with black hairs, 5–7 orange (Fig. 3) with black hairs, and tergite 8 and genital capsule dark brown. Sternites 1–4 brown with black hairs, 5–8 orange with black hairs. Male genitalia (Fig. 9): Genital capsule clothed in black hairs, except at apex of gonocoxites, where plume of coppery-brown hairs reaches about two-thirds length of each epandrial lobe.

Etymology: The specific name is derived from the Latin *badius* (= brown) and *peniculus* (= penis, tail), and refers to a little brown brush at the apex of the gonocoxites.

Comments: All specimens of *A. badipeniculata* sp. n. were probably in the series mentioned by Paramonov (1950: 104). This species is very different from other African congeners in thoracic and abdominal colour pattern. The integumental colour of the thorax and first four tergites of the abdomen is black, and the overlying vestiture is also black. This is in sharp contrast to the other two species which have extensive white tomentum overlying the integument on the scutum and abdominal segments. The species has only been taken in the Tankwa district of the Karoo, along with specimens of *A. alastor* (Fig. 10).

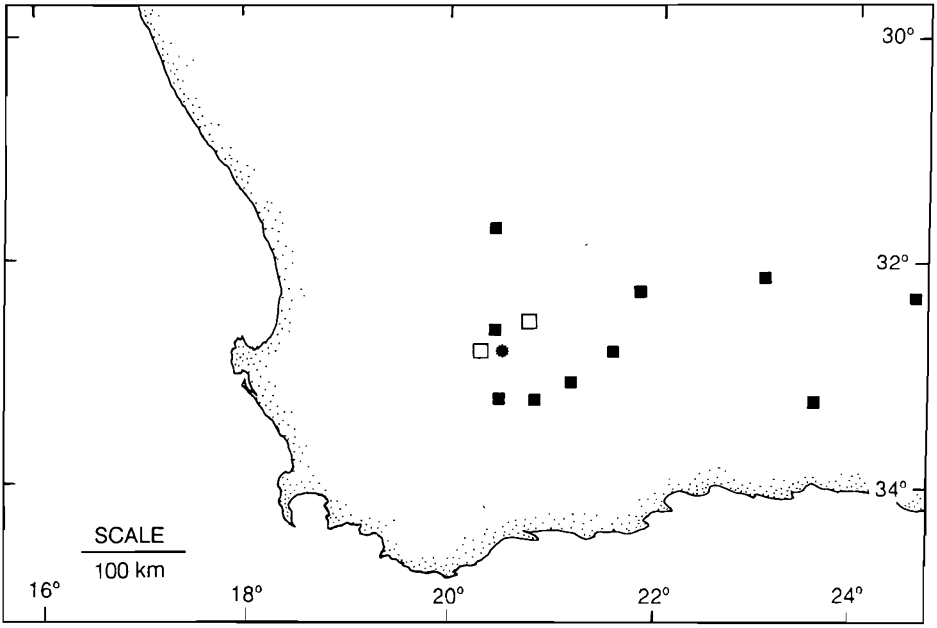


Fig. 10. Distribution of the three African *Apiocera* species [filled square = *A. braunsi* Melander; open square = *A. alastor* (Walker); star = *A. badipeniculata* sp. n.].

The male genitalia are typical of other *Apiocera*, as listed in the generic diagnosis. The epandrial lobes (Fig. 9) are more similar to *A. braunsi* than to *A. alastor*.

There is a female in SAMC from the same locality as the holotype. It is badly damaged by verdigris but agrees with the male in many respects, except that veins R_5, M_1 and M_2 become yellow-white near the wing margin and the integument of the abdomen is dark brown. I am not willing to describe this specimen as the female of *A. badipeniculata* until more specimens in better condition come to hand.

Key to African species of *Apiocera*

1 Scutum and scutellum entirely black .... **badipeniculata** sp. n.
– Scutum with longitudinal stripes of white tomentum; scutellum white 2

2 Anal cell with costal vein distinct, brown .... **braunsi** Melander
– Anal cell with costal vein absent .... **alastor** (Walker)

Specimens in collections occasionally become greasy, obfuscating the colour patterns. In this condition, *A. badipeniculata* sp. n. may still be distinguished from the other species by the entirely black integumental colour of the antennae.

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REFERENCES

ARTIGAS, J. N. 1970. Los apioceratidos de Chile con la description de cinco nuevas especies (Diptera-Apioceratidae). *Boletin de la Sociedad de Biologia de Concepcíon* **42**: 97–122.

BRÈTHES, J. 1924. Sur queleques diptères Chiliens. *Revista Chilena de Historia Natural* **28**: 104-111.

CAZIER, M. A. 1982. A revision of the North American flies belonging to the genus *Apiocera* (Diptera: Apioceridae). *Bulletin of the American Museum of Natural History* **171**: 181–263.

——— 1985. New species and notes on flies belonging to the genus *Apiocera* (Diptera, Apioceridae). *American Museum Novitates* **2837**: 1–28.

COQUILLET, D. W. 1910. The type-species of the North American genera of Diptera. *Proceedings of the United States National Museum* **37**: 499–647.

DANIELS, G. 1989. Family Apioceridae. *In*: N. L. Evenhuis ed., *Catalog of the Diptera of the Australasian and Oceanian Regions*. Honolulu: Bishop Museum Press pp. 324–325.

ENGLISH, K. M. I. 1947. Notes on the morphology and biology of *Apiocera maritima* Hardy (Diptera, Apioceridae). *Proceedings of the Linnean Society of New South Wales* **71**: 296–302.

HENNIG, W. 1966. The Diptera fauna of New Zealand as a problem in sytematics and zoogeography. *Pacific Islands Monograph* **9**: 1–81.

HERMANN, F. 1909. Beitrag zur Kenntnis der Apioceriden (Dipt.). *Deutsche Entomologische Zeitschrift* **108**: 104–122.

MCALPINE, J. F. 1981. Morphology and terminology – Adults. *In*: McAlpine, J. F. *et. al.* eds. *Manual of Nearctic Diptera*. Volume 1. Hull (Quebec): Agriculture Canada, Research Branch. (Monograph; No. 27) pp. 9–63.

MACQUART, J. 1838. *Diptères exotiques nouveaux ou peu connus*. Tome premier. -2e partie. Roret: Paris pp. 5–207.

——— 1847. *Diptères exotiques nouveaux ou peu connus*. 2e. supplèment. Roret: Paris pp. 5–104.

MELANDER, A. L. 1907. A new *Apiocera* from South Africa. *Bulletin of the Wisconsin Natural History Society* **5** (2): 125–127.

NAGATOMI, A. 1975. Family Apioceridae. *In*: Delfinado, M. D. & Hardy, D. E. eds., *Catalog of the Diptera of the Oriental Region*. Honolulu: The University Press of Hawaii p. 96.

PARAMONOV, S. J. 1950. A new African *Apiocera* species (Apioceridae, Diptera). *Journal of the Entomological Society of Southern Africa* **13**: 103–105.

——— 1953. A review of Australian Apioceridae (Diptera). *Australian Journal of Zoology* **1**: 499–537.

PETERSON, B. V. 1981. Apioceridae. *In*: McAlpine, J. F. *et. al.* eds. *Manual of Nearctic Diptera*. Volume 1. Hull (Quebec): Agriculture Canada, Research Branch. (Monograph; No. 27) pp. 541–548.

PHILLIPI, R. A. 1865. Aufzählung der chilenischen Dipteren. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* **15**: 595–782.

STUCKENBERG, B. R. 1980. Family Apioceridae. In: Crosskey, R. W. ed. *Catalogue of the Diptera of the Afrotropical Region*. London: British Museum (Natural History) p. 324.

TOFT, C. A. & KIMSEY, L. S. 1982. Habitat and behavior of selected *Apiocera* and *Rhaphiomidas* (Diptera, Apioceridae), and descriptions of the immature stages of *A. hispida*. *Journal of the Kansas Entomological Society* **55**: 177–186.

VERRALL, G. H. 1909. *British Flies*. Volume 5. Stratiomyidae and succeeding families of the Diptera Brachycera in Great Britain. London: Gurney & Jackson.

WALKER, F. 1849. *List of the specimens of dipterous insects in the collection of the British Museum*. Part II. London: British Museum pp. 231–484.

WESTWOOD, J. O. 1835. Insectorum novorum exoticorum (ex ordine Dipterorum) descriptiones. *London and Edinburgh Philosophical Magazine and Journal of Science* **3** (6): 447–449.

WOOD, D. M. 1991. Ground plan of the male genitalia of Brachycera (Diptera). *Abstract of the Second International Congress of Dipterology, August 27–September 1, 1990, Bratislava* p. 363.

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